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East Europe Report

SCIENTIFIC AFFAIRS

No. 672



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EAST EUROPE REPORT SCIENTIFIC AFFAIRS

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CONTENTS

INTERNATIONAL AFFAIRS

Briefs

CSSR-CDR Health Agreement

1

BULGARIA

Numerous Applications of IZOT 9115E Display Unit Described

(RADIO TELEVIZIYA ELEKTRONIKA, No 1, 1980)

2

Scientific Session on Computer Technology Held

(ZEMEDEL'SKO ZNAME, 11 Mar 80)

4

CZECHOSLOVAKIA

Utilization of Solar Energy in Agriculture

(Ales Blaha; MECHANIZACE ZEMEDELSTVI, Feb 80)

5

GERMAN DEMOCRATIC REPUBLIC

Closer Cooperation Between Science, Production Sector Detailed

(Werner Scheler; SPECTRUM, Feb 80)

13

Chemical Technology Institute Established at Academy of Sciences

(Various sources, various dates)

18

Significance of Institute

Purposes Outlined

Interview With Officials, Gerhard Keil, Peter

Grossmann Interview

CONTENTS (Continued)

HUNGARY

Statistics on Production of Computer Hardware Presented (Ervin Ban; IPARGAZDASAG, Nov 79)	25
Achievements of Videoton Enterprise Highlighted (HETI VILAGGAZDASAG, 22 Mar 80)	36
Briefs Soviet Minicomputers for Hungary ,	38

POLAND

Activities, Hardware of Information Science Association Described (Andrzej Aranowski; INFORMATYKA, Oct 79)	39
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INTERNATIONAL AFFAIRS

BRIEFS

CSSR-GDR HEALTH AGREEMENT--An agreement between the CSSR and the GDR on further cooperation in health during 1980 was signed in Prague. Both countries will primarily concentrate on scientific cooperation within the framework of CEMA, continuing research in the area of blood circulation, infections, work hygiene, professional diseases and prevention of disease in children and youth. The agreement also includes free health treatment of CSSR and GDR nationals located in the other partner's country. [Bratislava SMENA in Slovak 9 Apr 80 p 7]

CSO: 2402

NUMEROUS APPLICATIONS OF IZOT 9115E DISPLAY UNIT DESCRIBED

Sofia RADIO TELEVIZIYA ELEKTRONIKA in Bulgarian No 1, 1980 front cover

[Advertisement: "The IZOT 9115E Graphic Data Display Unit"]

[Text] The IZOT 9115E unit can be used for the display of graphic data, their digital coding and recording on the proper information carrier and is convenient for feeding these data into the electronic computer.

Areas of Use:

Designing and Industry:

- Drafting (as a component part of automatic computer designing);
- Developing control programs for metal-cutting machines with numerical program control;
- Data processing in measuring various production processes;
- Developing programs for printed circuits and testing for response;
- Laying out of integrated circuits;
- Designing the profiles of ships, airplanes, motor vehicles and so forth;
- Optimizing of pattern layout in light industry (for textiles, leather, and so forth);

Geodesy:

- Recording of coordinates with or without characteristic number;
- Calculating mountain and field areas, population points and so forth;
- Adding or subtracting areas to or from larger sections;
- Transforming polar coordinates into orthogonal ones and back;
- Scaling and changing coordinate systems;
- Determining lengths of isolines and measuring of distances (from photographs, maps, and so forth);

Scientific research:

- Mathematical modelling of curves;
- Calculating inertia moments and determining centers of gravity on surfaces and bodies with irregular shape;

Calculating of Fourier coefficients;
Analysis of oscillograms and slides;
Analysis of thermoluminescent curves to determine age of articles, rock
and so forth;

Medicine:

Microbiological measurement of cells (on the basis of their photography);
Analysis of cardiograms and encephalograms;
Determining the areas and volumes of organs;
Evaluation of diagrams for the analysis of blood, urine and so forth;
Evaluation of various microtapes;
Condensing of data from clinical research.

10272
CSO: 2202

BULGARIA

SCIENTIFIC SESSION ON COMPUTER TECHNOLOGY HELD

Sofia ZEMEDEL'SKO ZNAME in Bulgarian 11 Mar 80 p 2

[Unattributed conference report: "Information and Computers"]

[Text] IFIP are the initials of the International Federation for Information Processing. Its session which opened yesterday in Sofia and will last until 15 March is assembling in our country world-famous specialists from 20 nations in the area of scientific information and its practical application. At the same time as the session of the IFIP Council, the Executive Bureau of the Federation is meeting and it will be concerned with the preparations for the IFIP Congress in Japan.

As our representative was told by Academician Lyubomir Iliev, director of the Unified Center for Mathematics and Mechanics Under the BAN [Bulgarian Academy of Sciences], the main problems to be discussed at the session will be control, the organization and application of computers in various areas of the economy. During the session, groups of foreign scientists and individual specialists will visit our scientific centers and institutes in order to become familiar with the achievements of Bulgarian science in computers and information.

The participants in the IFIP session will be acquainted with the work carried out by the first national contest on programming and information in 1979. Participating in this contest were 355 of our mathematicians and they showed interesting solutions for five of the algorithmic languages: Algol-60, Assembler, Fortran, Cobol and PL-1. The jury headed by the Deputy Chairman of the BAN and Corresponding Member Blagovest Sendoz pointed to the significant professional growth of the programmers and the possibility of using the results in practice, that is, in the production and use of computers in the nation.

10272
CSO:2202

UTILIZATION OF SOLAR ENERGY IN AGRICULTURE

Prague MECHANIZACE ZEMEDELSTVI in Slovak No 2, Feb 80 pp 82-84

[Article by Professor Engr Dr Ales Blaha of Bratislava: "Solar Energy in Agriculture. Part III"]

[Text] In the third and last part of his article Professor Blaha discusses specifically the use of solar energy as available process heat in certain specialized branches of agriculture, greenhouse technology, and the problems of solar drying. He calls attention to developments in converting biological wastes and materials into energy, and to the feasibility of storing solar energy.

In conjunction with the harnessing of solar energy we often encounter the term "greenhouse effect." The greenhouse effect occurs in a space enclosed by transparent panels that transmit solar radiation only in the visible range, but not the infrared solar radiation. (Common glass and certain plastics have this property.) Inside the greenhouse heat develops through the transformation of the transmitted visible and other radiation in the basic materials of the greenhouse (for example, in the plants and soil). The heat is trapped in the greenhouse and does not escape into the atmosphere. Therefore the temperature in the greenhouse is higher than the ambient temperature.

The greenhouse's role in agriculture is much greater. The greenhouse may be defined as a space enclosed by transparent walls, within which--starting out from the local climatic conditions of the environment--a new special climate is created that is characterized by conditions suitable for plant cultivation as well as for plant breeding. The optimal conditions include light, temperature, humidity, CO₂ content, watering, deposition of salts in the soil, etc. Greenhouses become laboratories for investigating the cultivation of plants, and also operating areas for their artificial production (vegetables, flowers, etc.).

The following solar tasks arise:

To prevent in summer excessive insolation above a favorable level of 200 to 400 W/m²;

To maintain suitable temperature conditions in spring, autumn, at night, etc., either by advantageously utilizing the noontime surplus heat in the greenhouse or by solar-energy assisted heating with the help of overhead collectors;

To ensure the plants' adequate exposure to light and heat during their vegetation period.

Here we do not anticipate the use of artificial lighting.

The optimal functioning of a greenhouse presupposes thorough knowledge of the climatic conditions. The insolation inside the greenhouse consists of components processed by the walls. Processing occurs already by the fact that the transparent materials do not transmit infrared radiation. Further processing occurs, or can occur, if some of the walls are diffusing ones, changing the direct radiation into diffuse radiation. In this way the oblique solar radiation in the morning and afternoon does not pass unharnessed through the walls of the greenhouse but is trapped inside the structure.

Modes of Processing Solar Radiation

By curtaining the greenhouse roof and using it as a solar collector;

By choosing a suitable cross section for the greenhouse, for example, a trapezoid;

By designing the greenhouse with double walls, within a fluid may circulate to remove a proportion of the radiation into storage. If the fluid is a colored liquid, it can transmit only favorable light, for example, blue or yellow.

In view of the present energy situation, the problems of greenhouses are of secondary importance. Of primary importance are the energy-conservation tasks, i.e., the substitution of solar-assisted heating for conventional supplementary heating.

Solar Drying

About 1 kWh of energy is required to evaporate 1 kg of moisture. Let us consider some agricultural materials, and the energy required to obtain 1 ton of dry material. (Table 1.)

Example: Drying coffee beans. One ton of freshly harvested coffee beans contains 550 kg of water and 450 kg of dry matter. If the coffee beans are dried to a moisture content of 12 percent, the weight of the final product will be $450 \times 1.12 = 504$ kg. The moisture to be removed is $1000 - 504 = 496$ kg. To obtain 1000 kg of coffee beans containing 12 percent moisture it is necessary to remove $\frac{496}{504} \times 1000$ or about 1000 kg of moisture.

Since about 1 kWh is needed to remove 1 kg of moisture, the third column in the table gives also the energy requirements in kWh.

Table 1. Energy Required to Dry Various Materials

Tab. 1. Potreba energie na sušenie rôznych druhov materiálov.

Material	Pôvodná vlhkosť (%)	Konečná vlhkosť (%)	Odparená voda (kg . t ⁻¹)	Teplota sušenia (°C)
	(1)	(2)	(3)	(4)
(5) Tráva	65—80	15	1500—4000	30
(6) Obilie	20—40	14	50—400	40—110
(7) Kukurica	25—45	15	130—500	40—110
(8) Tabak	80	15	4000	35—75
(9) Káva	55	12	1000	50—80
(10) Ovocie	80	10	3550	40
(11) Hrozno	90	5	8500	40—50

Key:

1. Original moisture content, percent
2. Final moisture content, percent
3. Evaporated moisture, kg/t
4. Drying temperature, °C
5. Hay
6. Grain
7. Corn
8. Tobacco
9. Coffee beans
10. Fruit
11. Grapes

Example: Hay drying at an initial moisture content of 65 percent requires 1000 kWh per ton of dry hay.

To design the solar collectors and a suitable solar-heat store, it is necessary to know the drying time and the drying schedule. The drying time is determined also by the rate of moisture migration from the dried material. Another circumstance that determines drying is the requirement to avoid moisture condensation, i.e., a drying flow of a suitable temperature must be ensured. Which means that the drying process operates at relatively low energy efficiency.

Both mentioned effects concern the technology of drying, on which we are unable to dwell in greater detail here. If we know the quantity (Q) of energy required in terms of kWh as outlined above (as evident from the table, the value of Q ranges from about 100 to 10,000 kWh) and the drying time (ξ, in days) which may range from 2 to 10 days, then at average insolation H (in kWh/m²) the average hours of daytime insolation (t) and an energy efficiency of 0.3 we have a collector area

$$S = \frac{Q}{\xi t} \cdot \frac{1}{0.3 \cdot H}$$

Example: Let Q = 1000 kWh, ξ = 4 days, t = 10 h, and H = 0.4 kWh.

$$S = \frac{10^3}{4 \cdot 10} \cdot \frac{1}{0.3 \cdot 0.4} = 210 \text{ m}^2$$

The average capacity is $1000/(4 \times 24) = 10.4$ kW.

A proportion of energy Q is used up in daytime, and a proportion must be stored for the night-time process.

Example: In the preceding example it is necessary to supply 250 kWh. This includes the energy supplied during the 10 hours of daylight, $Q_1 = 10.4 \times 10 = 104$ kWh. During the 14 night-time hours the energy that must be supplied from the solar-energy store is $Q_2 = 10.4 \times 14 = 146$ kWh, and the collector must deliver this energy to the store by day. The collector's daytime capacity must be $250/10 = 25$ kW. The collector's input must be $25/0.3 = 84$ kW.

A water store for solar energy is determined as follows: Let the temperature at night (t_2) drop, say, from 70 to 60°C, and then $\Delta T = 10^\circ\text{C}$. If the volume (V) of the store is determined in liters, then for the purpose of finding the quantity of energy Q_2 in kWh

$$\frac{4.18 \cdot 10^3}{10^3 \cdot 3.6 \cdot 10^3} V \cdot \Delta T = Q_2$$

Consequently

$$V = 0.86 \cdot 10^3 \frac{Q_2}{\Delta T}$$

Example: Let $\Delta T = 10^\circ\text{C}$, $Q_2 = 150$ kWh. Then $V = 0.86 \cdot 10^3 \frac{150}{10} = 12,900$ liters.

It is estimated that a store of 50 to 100 liters is required per kWh of night-time energy. To design an air-circulating solar energy collector for drying it is necessary to find the average for the collector.

Let us estimate that one liter of air contains 3 cal or about 12J, which is about $3 \cdot 10^{-6}$ kWh of heat that can be used for drying. Then for a drying effect of 1 kWh (the evaporation of 1 kg of moisture) we require about 300 m³.

Example: We have to dry out 5000 kg of moisture in 5 days, i.e., 40 kg of moisture per hour. The necessary air flow is $40 \times 300 = 12,000$ m³/h.

An air flow of $12,000 \text{ m}^3/\text{h} = 3.33 \text{ m}^3/\text{sec}$. If the cross section of the duct is $2\text{m} \times 0.4 \text{ m} = 0.8 \text{ m}^2$, the flow velocity is about 4 m/sec.

The efficiency of both the air-circulating solar collector and the drying process is low. For example, about one-sixth of the heat in the air flow is utilized. Recycling is feasible, i.e., after drying the regenerated exiting flow may be recirculated. Then the heat source or solar collector supplies only the supplementary heat.

Biological Sources of Energy

Biological sources of energy have not been widely used in our country so far. They have been used in China and India, and individually in Europe on some farms, particularly during World War II (in France, Denmark, etc.).

The use of biological sources of energy is now being organized as a large-scale industry, for example, in France, the United States, the Federal Republic of Germany and elsewhere. It is proceeding in two directions:

- a) The use of wastes for the generation of energy, and
- b) Energy farms and plantations of highly productive algae or plant and micro-organisms, for generating energy.

In the following we will consider primarily the first method. In agriculture and forestry it is possible to use wastes such as straw, dry stalks and vines (for example, of corn or potatoes), stable manure, timber wastes (for example, branches, sawdust) and paper-mill wastes.

The paper mill in Horní Vetrní has been flooding the Vltava with waste chips for decades. On a wider scale it is possible to use industrial wastes (from food processing (in France, for example, the wastes from winemaking) and municipal sewage.

There are several processes for the utilization of wastes:

Fermentation and the generation of methane (the traditional method employed by small farms);

Catalytic conversion of ground cellulose and the production of hydrogen and methane;

Oxidation of glucose ($C_6H_{12}O_6$) or glycerol ($C_3H_8O_3$) in fuel cells, and thereby the direct generation of electricity from organic materials.

According to a French study, the following quantities of energy (in megatons of standard fuel equivalent) can be gained in France annually:

Regeneration of agricultural wastes	10 Mt
Regeneration of industrial wastes	4 Mt
Regeneration of forestry wastes	20 Mt
	34 Mt

Example: Ten megatons of standard fuel equivalent corresponds to $3 \cdot 10^{17}$ J of energy. There are $3.1 \cdot 10^7$ seconds in a year. The mentioned energy thus corresponds to a capacity of about $10^{10} \text{ W} = 10^4 \text{ MW}$, i.e., to the installed generating capacity in Czechoslovakia.

Fermentation

This process has been employed in rural areas in recent years. Agricultural wastes were allowed to undergo fermentation in pits. Bacteria decomposed the material (cellulose), forming methane, CH_4 . There are views on the effect that this energy can be produced by fermentation at approximately one-tenth of the cost of nuclear power.

Biowaste

Forestry wastes, sawdust and straw are mixed with water and are subjected to a temperature of 500°C under anaerobic conditions, for example, in a boiler heated by concentrated solar energy from solar collectors. A large pyrolytic power station that would consume 100 tons of vegetable matter a day would have a capacity of about 10 MW.

Example: If the conversion of 1 kg of waste generates about 7200 kcal or $7.2 \cdot 10^6$ J, then a capacity of 100 tons/day corresponds to a generating capacity of $10^5 \cdot 7.2 \cdot 10^6 = 7.2 \cdot 10^{11}$ J/day, which is approximately 10 MW.

Generation of Electricity in Fuel Cells Containing Organic Materials

This is a noteworthy process that appeared recently in the technical documentation. It was found that cellulose, starches and other glucose polymers as well as sugars can be converted into variants, particularly glycerol. The great advantage of these materials over hydrogen is that they can be stored safely and flexibly. The initial experiments demonstrated that with glycerol in an acid bath it is possible to generate electricity in the same way as in other fuel cells. These initial results would be of great significance in the future.

Algae Farming

Algae can be grown in household, municipal, agricultural and industrial sewage. Basins about 25 cm high are used for this purpose. The annual harvest is 40 to 100 tons of material per hectare. Annually it would be possible to harvest (in France) $1.6 \cdot 10^5$ tons in food-industry sewage, $7.2 \cdot 10^5$ tons in agricultural sewage, and $1.2 \cdot 10^6$ tons in municipal sewage, which is a total of $1.7 \cdot 10^6$ tons or about 900 MW.

In conclusion it can be established that the supply of biological materials for energy conversion can be estimated at 10 tons per hectare, i.e., from one hectare it is possible to gain a capacity of $7.2 \cdot 10^{11}$ J (or $1.1 \cdot 10^7 \cdot 10^4 \text{ W} = 11$ kW). The material must again be hauled and concentrated from a large area. However, its storage can be solved easily, and the operation of a power station for converting biological sources of energy could be continuous.

Solar-Energy Stores

Solar-energy stores are now divided into sensible-heat and latent-heat types.

In the first type the heat is stored in low-cost materials (water, crushed stone), preferably materials with a high heat capacity. The container with the material is heat-insulated. Losses and usage deplete the stored heat. The other type stores latent heat (heat of crystallization and fusion, etc.). The tank containing the material has a constant temperature as long as phase changes occur.

The solar-heat store's design depends on the required temperature and the time during which the store has to function.

Water or crushed stone are suitable storage materials for agricultural purposes. The thermal properties of these materials are summed up in Table 2.

Table 2. Thermal Properties of Water and Crushed Stone

	Heat capacity (kJ/kg°C)	Volumetric heat capacity (kJ/m ³ °C)	Specific weight (kg/m ³)
Water	4.18	$4.18 \cdot 10^3$	1000
Crushed stone	0.9	$2.70 \cdot 10^3$	2500-3000

Water has a smaller volume than crushed stone does, but water also requires a heat-exchanger. Crushed stone can be arranged more easily, does not require a water-tight tank and can serve simultaneously as a store and a heat-exchanger.

Example: At a temperature drop of 10°C, a water store of 1 m³ releases $[1] 4.18 \cdot 10^3 \cdot 10 = 4.18 \cdot 10^7 \text{ J} = 11.5 \text{ kWh}$ of energy.

The use of salt to store latent heat reduces the volume of the store by the order of magnitude. For example, Glauber's salt ($\text{Na}_2\text{SO}_4 \cdot 10 \text{ H}_2\text{O}$) has a melting point of 32°C and a heat capacity of 215 kJ/kg. The ratio of the heat capacities of a kilogram of water and a kilogram of Glauber's salt is $215/43 = 5$.

An even greater reduction in volume can be obtained by using, for example, lithium hydride. Its volumetric efficiency in comparison with water is about 20. However, it is very expensive. Latent-heat stores are encountering corrosion and fatigue problems for the time being. There are very many variants of latent-heat stores for high temperatures from 300 to 600°C.

The design of heat stores depends also on the length of time during which they are to function. A store may be selected as a function of the power station's energy (Table 3). We distinguish stores for 1 day, 7 days (duration of rains), and 10 to 40 days of operation.

Table 3. Energy Stores

Application	Operation (days)	Proportion of power station's energy
Irrigation	0.5	0.002
Refrigeration	5	0.025
Heating in summer	10	0.05
Heating in winter	15	0.075
Power settlement	20-40	0.1

Example: A state farm has 100 workers and consumes 10^5 kWh annually. A heat store must be designed for about 10 days of operation. We choose a water store and assume a permissible temperature drop of 20°C . Then from 1 m³ of storage capacity (the example cited above) we may draw approximately 10 kWh. The energy requirement is $\frac{10}{365} \cdot 10^5 = 2740$ kWh

The store must then have a volume of $2740/20 = 137$ m³.

According to Table 3, the store should have a capacity of about

$$10^5 \cdot 0.05 = 5 \cdot 10^3 \text{ kWh}$$

Conclusion

Since the nature of farmwork is directly associated with sunshine, farmers have a very positive attitude to using solar energy for process heat, special cultivation, drying, etc. Socialist collective farming with its large farm units means that agricultural appliances may be regarded as stations of intermediate capacity, for example, from 10 to 500 kW. Connecting these appliances to sources of solar energy could ease the energy situation considerably and simultaneously could improve the quality and quantity of farm production. Further possibilities lie in that the farmer can also become the supplier of biological sources of energy. With its special requirements, possibilities and initiative, agriculture is making a very valuable contribution to the design and technology of solar-energy equipment.

1978

1978

CLOSER COOPERATION BETWEEN SCIENCE, PRODUCTION SECTOR DETAILED

East Berlin SPECTRUM in German Vol 11 No 2, Feb 80 pp 2-5

[Article by Werner Scheler, member, SED Central Committee; president, GDR Academy of Sciences: "Science and Production Cooperate Ever More Closely"]

[Text] The remarks of the president of the academy at the Eleventh Plenum contains basic reflections on the question of how scientific results from basic research can be made effective more rapidly. In commending the contributions which the academy is already making for socialist industry, Professor Scheler notes, however, that: "A higher overall potential is contained in the collective of the academy than is presently being used." In addition, the criteria for evaluating the work of the academy are changing with the continuous development of science and industry. Graded performance analyses therefore belong to the critical prerequisites for higher quality and effectiveness of our research.

The Politburo report delivered by Comrade Erich Honecker and the foundations of the 1980 Economic Plan have my unreserved support. They bear the Politburo's leadership activity in behalf of the well-being and security of the people of our nation in accordance with our political principles. I emphatically welcome and support the requirement for a further increase in the productivity of our economy and the intensification of all social processes. I consider this, above all, as a direct requirement for science and, in no way diminished, also for my own area of responsibility, the GDR Academy of Sciences.

From the party leadership and the government of our nation, the academy--along with the university system--has the commission to scientifically pioneer the practice of tomorrow and beyond. We feel obligated to accomplish this task, and the basic research in our institutions is oriented to this goal. However, just as tomorrow evolves from today, so must also the research for tomorrow form a continuity with the research and development for today. The scientific work in the academy and in the

university system are thus to be considered as branches of a unified whole together with research and development work in industry, agriculture and all other social areas. This unity obligates us to understand and harmonize with our comrades in the production and user areas.

This cooperation has developed well in recent times. The competitions associated with the observation of the thirtieth anniversary of the founding of the GDR contributed very significantly to this result. We estimate that by the end of the year we can expect to complete the remaining planned tasks with good quality and on schedule.

For 1980 numerous demanding tasks contributing to peak performance in industry were injected into the research programs of the academy and the university system with the agreement of the ministers and combines; the most important of these are

- Work toward developing and managing the basic stock of raw, semifinished and finished materials and the associated manufacturing processes,
- Contributions to the microelectronics program of the GDR,
- Tasks for increasing the technological level of production in various branches of the economy and
- Contributions to securing nutrition and health.

We are not yet satisfied with the amount and, to some extent, the scientific emphasis of the efforts applied to the development of the energy and raw material bases. Here, additional tests are presently underway in the facilities of the Academy of Sciences to become even more effective in these areas.

The GDR Academy of Sciences sees in the strengthening of the economic power of our republic a determining and long-term strategic orientation of basic research. In this connection, we assign extraordinary importance to coordinating the development concepts of various economic areas with basic research. Several conclusions in this regard can be listed from previous experience.

First, Close coordination with practice is for the academy an indispensable part of its social integration and effectiveness. Continuous involvement with the problems of the economy and industrial development is a stimulus for science which cannot be prized highly enough. It teaches the scientist to measure the goals and results of his work in terms of the necessities of life and our future. Conversely, the involvement continuously provides the user with the knowledge and results of basic research and new inputs regarding trends, effectivity and quality of production. Thus, we are gratified that the Academy Institute has become an ever more sought after partner of industry and other areas, so much so that the inquiries and requests directed to us can no longer be completely satisfied.

Second: The contributions of the academy to the economy and to the health care system receive an increasingly higher economic ranking even though it is very difficult to quantify exactly the economic utilization of basic research. To a certain extent, evidence of such utilization can only be determined by concrete examples. In this we do not always receive a warm response when we want to find out how certain research of the academy is reflected in the economic results of a combine or factory. I must admit that such direct evidence is not always possible. However, the following figures are interesting: Just in the increase of fractographic investigations undertaken in 1978 for local industry by the Academy's Institute for Solid Physics and Electron Microscopy, a saving of several million marks from damage prevention can be claimed. A new principle of cold forming of metallic materials, especially applicable to wire drawing, developed in the Academy's Central Institute for Solid Physics and Materials Research can be expected to generate an annual utility of about DM 175 million following the first large-scale tests in industry; with expanded use, this figure will probably be distinctly higher.

I would like to dwell a while longer on the problem of utilization of basic research. With such examples, it can of course be indicated; however, it cannot be revealed in its total potential. I question, for example, how high would have been the appraisal of the economic value of the researches of a Madame Curie on radioactivity or of Otto Hahn on nuclear fission during the first 10 years of this century and how high it would be valued from today's perspective after modern isotope technology, nuclear technology and nuclear energy had been developed from such basic research. To me, it appears that similar fundamental developments are presently underway in the area of molecular and cell biology for genetic engineering in particular and for biotechnology in a broad sense. In other fundamental areas, there is likewise much activity. Even yet, current, practical application is frequently valued and honored more highly by society than the publicly less visible paths of new knowledge and methods; the latter, however, determine to a large degree our future development.

Third: We have become economically more effective in all cases wherein capabilities for technological work--pilot plants and such--were provided. That affects to a degree related conditions in our own institutes to the extent that they have available technical and test installations and to a degree the technical-technological capabilities of our partners. The Central Institute for Solid Physics and Materials Research mentioned by Comrade Honecker has just such equipment at its disposal; various other institutes still have too little such equipment. Unfortunately, there are hardly any available, useable test and pilot installations in industry so that a bottleneck has developed here in the effectiveness of interaction between basic science and production and, thus, in the speed of transfer of results.

Certainly, it is required that the academy strengthen its technical-technological base although this is more than difficult under the present

economically conditions. However, we are much more strongly committed to the expansion and qualification of the research and development capability of the combines of our state enterprises so that pilot tests and applications research can be carried out in greater scope. The production process requires greater and greater scientific penetration, and the speed of transfer determines more and more the market effectiveness of products. This requires, in our opinion, the execution of the orientation toward the build up of branch-specific basic research in the combines, as ratified by the Politburo and the Council of Ministers in 1975. This would provide the prerequisite for the reception and further processing of basic knowledge.

From the standpoint of the academy and the university system, we see our responsibility in the conceptual and personnel support of industry during the build up of this branch-specific research. The academy and the universities can, however, in no way make up for insufficient effort in the economy; the greater the capabilities and qualifications of our industrial partners, the more effectively our institutions can serve practice.

Fourth: Our close interaction with industrial practice and identification with the needs and requirements of business as a starting point for basic research gives rise to a problem: the possible underestimation of the value of knowledge oriented research which, of course, does not, a priori, directly serve the satisfaction of industrial needs. Although solid materials are used universally in industry—in construction and other areas—there is, for example, still no basic theory of real solid materials. Even though no one would consider removing catalysts from the production process in the basic chemical industry—Comrade Mueller discussed this—the theory of catalysts is still largely of a phenomenological character.

Whenever theoretical breakthroughs have been achieved, however, qualitatively new types of effects on production have resulted. Examples of this can be listed from quantum optics, semiconductor physics, information theory, molecular genetics and many other areas of science. In the academy we consider it a requirement to give unrestricted attention to the research of fundamental problems and to greater theoretical depth in our work. If we neglect this, then we forego the possibility of initiating fruitful developments ourselves or of entering in a timely manner obviously promising areas on the international level.

Basic research requires, in addition to its plan effective integration into the industrial reproduction process, a considerable amount of such knowledge-oriented research; for this, it requires the necessary flexibility and the freedom to probe new ideas, to test critical questions which surface in the research process, to query and make requests of neighboring disciplines, especially regarding important interdisciplinary problems. From this, we promise ourselves the impetus for new methodologies and new starting points for attacking economically relevant topics.

Fifth: The internal effectivity of scientific work in the academy by no means satisfies us. Certainly, we have clearly progressed in recent years; yet, an overall higher potential is contained in the Academy Collective than is presently used. The evaluation criteria for our work are, in addition, not a constant; they change with the ongoing development of science and industry. That was once again unmistakably expressed by Comrade Erich Honecker in the Politburo report. There is a set of subjective and objective factors which limits the efficiency of our collective. We reported on this at the group delegation conference of our party organization at the beginning of last year and to the directors of the Institute in September.

We consider a graded performance analysis and performance evaluation plus a critical discussion of the performance question in the collective as very critical keys to higher quality and effectiveness in our research. In this, we are quite consciously building on the next generation, on a nucleus of young people, rich in ideas and initiative, who do not shy away from new methods nor before the risk of the unknown. Party organization, governmental leadership and the unions have made all of these things a central consideration of their work. Problems overwhelm us again and again in several aspects of the materiel-technical accomplishment of scientific work, especially as regards literature, equipment, components, chemicals and other research tools. The effectiveness of our work depends in considerable measure on these things. I welcome, therefore, the very specific orientation related to this given in the Politburo report.

The academy and university system have a clear conception relating to the content of the main streams of basic research during the next 15 to 20 years. The research strategy emanates from the internal dynamics of the scientific development and orients itself to important social requirements. Hundreds of scientists have worked on this long-term concept in close collaboration with their industrial counterparts in a responsible professional and political manner.

Our focus can and must, of course, be directed not only on the scientific process; it must also take account of the concrete contributions of research to our present.

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CHEMICAL TECHNOLOGY INSTITUTE ESTABLISHED AT ACADEMY OF SCIENCES

Significance of Institute

East Berlin DIE WIRTSCHAFT in German Vol 35 No 2, 7 Feb 80 p 25

[Article signed M.P.: "Intensified Technological Research at the GDR Academy of Sciences"]

[Text] Effective 1 January 1980, an Institute for Chemical Technology has been established at the GDR Academy of Sciences to work in the field of chemical research.

The Director of Chemical Research and member of the Academy, Prof Gerhard Neil (Doctor of Natural Science, Doctor of Engineering), has been appointed Director of the Institute by Prof Dr Werner Scheler, president of the Academy of Sciences.

For two reasons, chemical technology finds itself in a key position: First, because it is through it that the application of new scientific knowledge to other branches of chemistry and other scientific fields in the material processing industry becomes possible.

Second, because it uses the experience gained in material processing operations to obtain the knowledge necessary to develop and introduce highly effective production processes in other branches of the national economy, and to produce for them a steadily increasing number of active substances and materials.

Complex Subjects

The establishment of the Institute for Chemical Technology marks a stage in the realization of the increased demands made by the 9th SED Congress. As a result, the wide range of fundamental research at the Academy and in other research facilities will be used more intensively to achieve technological development and progress. The tasks are complex, they place heavy demands on disciplinary fundamental research, and they require interdisciplinary cooperation.

The application of scientific knowledge to all branches of chemistry, process engineering, energetics and economy will provide foundations for new and highly effective processes in the material processing branches of the industry.

Chemistry is one of the most productive branches of our national economy, and a highly dynamic one; it creates the essential conditions necessary to increase the productivity of other branches.

The Academy's Institute for Chemical Technology has been founded essentially on the basis of material and personnel resources existing in the chemical research field. The work performed at the Institute, in cooperation with the industry, will concentrate on the following, economically important fields:

- intensified utilization of domestic silica raw materials;
- effective utilization of fossil carbon carriers (primarily oil and domestic brown coal), both as raw materials and to produce energy;
- development of lubricants with high functional characteristics;
- technological realization of organic syntheses to produce highly refined products (e.g. organic intermediates for the pharmaceutical and cosmetics industry).

The present technical profile of the Institute is essentially marked by the assignment of technological tasks which are taken from the division of fundamental chemical technology of the Central Institute for Organic Chemistry.

The results already achieved in various domains of chemical technology form the basis of further research tasks.

Emphasis is being put on the utilization of raw brown coal (especially salt-containing brown coal), both as a raw material and to produce energy. Next to the continued development of proven carbo-chemical processes, such as low temperature carbonization, gasification and coking, work will also be carried out to develop new operating principles for coal extraction in order to obtain valuable coal materials and extracts for the production of electrode cokes, by coupling a hydrothermal coal treatment with the extraction. The complex utilization of domestic raw brown coals also involves research on the utilization of aluminum-containing brown coal filter ashes.

Regarding the whole question of the intensified utilization of domestic mineral raw materials, in addition to power-plant ashes, efforts have been made to develop processes to reduce the level of harmful substances of selected quartzes.

Research dealing more extensively with oil processing through thermocatalytic cracking of petroleum residues will contribute to cover the needs of our national economy for petrochemical products.

The Institute also carries out technological development work concerning the production of highly refined organic intermediates. Its method of operation is thus characterized also by a wide range of economically relevant systems, from inorganic raw materials, to oil, brown coal and high-grade chemical specialty products for our national economy, and to research on lubricants; but, of course, the Institute can work only on selected contributions.

Essential national partners cooperating with the Institute are, among others, the Scientific and Technical Center for Carbochemistry, the Ministry for Chemical Industry, the Schwedt Petrochemical Combine (a state enterprise), the Freiberg Mining Academy, the Leuna-Merseburg Technical College, the Freiberg Fuel Institute, the Research Institute for Nonferrous Metals, the Dresden Institute for Mineral Raw Materials and Mineral Deposits, the Ilmenau Technical Glass state enterprise, and the Kemnitz Silica Raw Material Combine (a state enterprise). The objective is to achieve a sharing of responsibility with the industry by transferring and utilizing the results obtained jointly.

Purposes Outlined

LEIPZIG LEIPZIGER VOLKSZEITUNG in German 1-2 Mar 80 p 10

['Aspekte' feature article: "Purposes of Academy Institute for Chemical Technology: Research on Possibilities for Utilization of Domestic Raw Materials." A translation of the East Berlin SPECTRUM interview with Director Gerhard Keil follows this article]

[Text] The Institute for Chemical Technology which has just been established at the GDR Academy of Sciences will primarily elaborate scientific bases for the utilization of domestic silica raw material, and will conduct investigations to optimize the utilization of fossil carbon carriers (especially oil, natural gas and brown coal), both as raw materials and for the production of energy. These and other tasks have been mentioned by the director of the new Institute, Gerhard Keil, member of the Academy, in an interview with the magazine SPECTRUM.

In addition, the Institute will also get involved in scientific and technical research on the fundamental operation of small-scale production processes and, based on this research, it will engage in the production of small amounts of chemical specialty products. A fourth task will consist in scientific research on friction, lubrication and wear. In this respect, research will bear primarily on the mechanism of the action of lubricating oil additives, as this is expected to lead to material and energy savings in the operation of all kinds of machines.

The Institute has its origin in the "fundamental chemical technology" Division created in 1977 at the Central Institute for Organic Chemistry where, during its three years of existence, its physiognomy has changed from that of an institution predominantly oriented toward the natural sciences, to take a stronger technological orientation after scientists from technical disciplines and economists had joined it.

To intensify production processes in the chemical industry, scientists--according to Prof Keil--have been contributing process analyses for years. The most important task of fundamental research, he said, is to find the weak points and to propose effective solutions. Another possible way of intensifying current production processes lies in the development of processes for the production of new products, added Dr Peter Grossmann, deputy director of the Institute.

As an example, he mentioned the development of a process for the production of conductive polymers which were developed in cooperation with partners having practical experience.

Cooperation with the industry, according to Prof Keil, has always been more successful when it was based on concrete agreements. Joint specifications or planning consultations with industrial partners have also proved valuable.

To test technological developments, the Institute, in addition to workshops, has two technical schools at its disposal, where small-scale testing plants can be installed and operated. Without the support of the service facilities of the Academy in Berlin-Adlershof, the Institute could not manage to solve such problems, said Prof Keil. In addition, special problems require the cooperation of chemical plant constructors, and corresponding arrangements are made with them ahead of time. In the Institute's technical schools, developments are carried out only to the small-scale testing plant stage--however, as Prof Keil pointed out, this does not happen in every case. This is why, he said, cooperation with the industry at an early stage is necessary for the Institute.

Interview With Officials

East: Berlin SPECTRUM in German Vol 11 No 1, Jan 80 pp II-III

[Interview by Sonnhild Kutschmar, SPECTRUM editor, with Gerhard Keil, member, GDR Academy of Sciences; chief, Chemical Research Branch; director, Institute for Chemical Technology. and Dr Peter Grossmann: "Institute for Chemical Technology Established"]

[Text] [SPECTRUM] A few years ago, scientists at the Academy did not accept without opposition the idea that fundamental research must be carried out also in the science of production, i.e. in technology. When this was recognized, the "fundamental chemical technology" division was established

at the Central Institute for Organic Chemistry in 1977. What were the research collectives which composed this division, and how has it fared?

[Dr. Grossmann] Well--to answer this question right away: The participants were the interface chemistry division of the Central Institute for Physical Chemistry, the raw materials division of the Central Institute for Inorganic Chemistry, the technical chemistry division and the technical school of the Central Institute for Organic Chemistry; plus, starting in 1978, the process and systems analysis division which is especially concerned with the effective utilization of fossil carbon carriers. In the past three years, the physiognomy of the division has changed from that of an institution predominantly oriented toward the natural sciences, to take a stronger technological orientation after scientists from technical disciplines and economists had joined it.

[Prof. Keil] This happened because we had integrated into larger programs subjects which had been studied in different collectives; this made interdisciplinary work necessary.

[SPECTRUM] What are the results which have been achieved during the past two years by the division personnel?

[Dr. Grossmann] Let us take two examples! You know what rock crystal is--this beautiful transparent mineral which unfortunately rarely occurs naturally in our country. Chemically speaking, it is SiO_2 --silicium dioxide. Until now, we had to import it at a high cost and in large quantities to cover the requirements of our flint glass and high-purity optical glass production. At the suggestion of our industrial partners, members of our division studied this problem and--in cooperation with the Freiberg FIA [expansion unknown] and the Central Institute for Inorganic Chemistry--they developed the scientific bases for a process to produce high-purity SiO_2 carriers from domestic raw materials. The results are to be tested in a production pilot plant.

Long-range considerations on the effective use of our raw materials in the chemical industry have brought to our attention the utilization of feldspar-containing rocks. The fundamental chemical technology division developed scientific bases for the production of aluminosilicates, zeolites, aluminum oxide, glass raw materials and calcium silica hydrate from these rocks. Application tests showed that the new products could successfully be used to replace conventional products such as carbon black and titanium dioxide. Our economists subsequently investigated this process, using a newly developed dynamico-economic comparative method and determined that such processes can definitely be economically effective in the long range. Of course, we know perfectly well that economic evaluations of fundamental research results remain problematic. But, at least, we can use them as a basis for a decision on whether to adopt research results for process development.

Q. (Mr. Bell) We should make it clear that, until now, hardly any chemical institute is in a position to undertake an economic assessment of newly developed principles. The indicators provided by natural scientists and technologists are just not adequate. What we need is a close cooperation between various scientific disciplines and a profound knowledge of one another's work. The methods developed by our economists permit the assessment of a complex process at an earlier stage of fundamental research, from the point of view of its utility to society as a whole.

ANSWER: Is not the much discussed interdisciplinary cooperation a novelty in this case?

Q. (Mr. Bell) No, not at all. We must take into account that interdisciplinary cooperation can take place at several levels, for instance between institutions--let us call it the indirect form--where each institution attacks the problem to be solved from its particular direction; or through direct interdisciplinary work. This takes place within the collective where members of various scientific disciplines work together. The most important condition, then, is that each should have a solid knowledge of his own discipline, because interdisciplinary work can succeed only on a high scientific level, and a high scientific level presupposes an exchange of experience and debates even within one's own scientific field. It is not enough to acquire the terminology of other disciplines; cooperating scientists must also penetrate the thought structure, the methodology of the foreign field. Altogether, we feel that both forms of interdisciplinary cooperation are necessary.

Q. (Mr. Bell) Obviously, the fundamental chemical technology division has struck the acid test. The Academy directors have used it as a foundation for the Institute for Chemical Technology which was created in January 1980. What are its duties?

A. (Mr. Bell) In two years of intensive work, the fundamental chemical technology division has created a very good image of itself which we would like first to highlight by the work done at the Institute, and later on to diffuse. The new Institute will cooperate itself with the elaboration of scientific bases for the utilization of domestic silica raw materials, and it will undertake investigations to optimize the utilization of fossil energy carriers (especially oil, natural gas and brown coal), both as raw materials and to produce energy. It will also carry out scientific and technical work concerning the fundamental operation of small-scale production processes and, based on this research, it will engage in the production of small amounts of chemical specialty products. A fourth task will consist in scientific research concerning friction, lubrication and wear. In this respect, research will bear primarily on the mechanism of the action of lubricating oil additives, as this is expected to lead to material and energy savings in the operation of all kinds of machines.

(SPECTRUM) How will the Institute for Chemical Technology contribute to the intensification of production processes in the chemical industry?

(Prof. Reil) Science can also become a productive force when the most recent knowledge is introduced in current production processes, thus intensifying them. This is why we have been studying process analyses for a few years. These deal with quantitative investigations of all functional relationships which characterize a process and occur during its course. The most important task for fundamental research is to find the weak points and to propose effective solutions. However, I believe that explaining this to SPECTRUM readers would be like carrying coals to Newcastle, since this problem was discussed in detail not quite two years ago (SPECTRUM August 1976).

(Dr. Grunemann) Another possible way of intensifying current production processes resides in the development of processes for the production of new products. I am thinking, for example, of the development of a process for the production of conductive polymers which has been elaborated by one of our working groups jointly with the Teltow (POC [expansion unknown] and the Berlin-Chemie state enterprise. Considerable improvements in effectiveness can be achieved with the materials obtained by this process, for instance in the oil and natural gas industry to flush wells, or in the rubber industry to coagulate latex.

(SPECTRUM) How is the cooperation with industrial partners organized?

(Prof. Reil) We would certainly bore SPECTRUM readers if we were to relate the many proven types of agreements, joint specifications or planning consultations. Cooperation has always been most successful where it has maintained various forms of socialist teamwork on the basis of concrete agreements. We intend to carry this on. We find ourselves in a favorable situation to do so since many members of our personnel have not only good relations with the industry, but possess industrial experience themselves.

(SPECTRUM) Technological developments must be tested. Do you have the necessary personnel and the necessary technical facilities?

(Dr. Grunemann) As we already said, a technologically oriented scientific institution must of course possess workshops where to build small-scale testing facilities, and these workshops exceed by far the usual dimensions of a scientific institute. Next to its existing facilities, the Institute for Chemical Technology has two technical schools where small-scale testing facilities can be installed and operated.

(Prof. Reil) Without the strong support of the service facilities in Ebersdorf, we could not manage to solve such problems. For special problems, we even need the cooperation of chemical plant constructors with whom we make the necessary arrangements ahead of time. In our technical schools, developments are carried out only on the small-scale testing plant stage—and not even in every case. Therefore, cooperation with our colleagues in the industry at an early stage is a vital necessity for us.

STATISTICS ON PRODUCTION OF COMPUTER HARDWARE PRESENTED

Independent IPARGAZDASAG in Hungarian No 11, Nov 79 pp 45-48

[Article by Mrs Ervin Ban of the Central Bureau of Statistics: "The Manufacture of Computer Technology Devices in the Mirror of the Central Computer Technology Development Program"]

[1981] A central computer technology development program was worked out in Hungary in 1971 on the basis of a government resolution according to which the goals of the program were:

- laying the foundations for and spreading computer technology culture, because this is a substantial aid to and condition for increasing social efficiency and economic growth, and

- expanding modern computer technology manufacture or the precision engineering and electronics capacity suitable therefor, which would improve the structure of the machine industry in the direction of a selective industrial policy.

The program touches on a number of aspects of production and utilization--development of the computer park, the manufacture of computer technology products, international cooperation, research and development activity, the training of experts, etc.--and it can thus be regarded as one of the significant complex developmental conceptions of our economic policy.

In this article we intend to examine in some detail the achievements of only one part of this, the manufacture of computer technology devices and the problematic questions interdependent with manufacture.

The Development of the Production and Sale of Computer Technology Devices

The acceleration of technical progress throughout the world has resulted in an extraordinarily dynamic development in the manufacture and utilization of computers. By making use of electronic methods the domestic computer industry moved out of the traditional office machines manufacturing branch into the area of the telecommunications and electric instruments industry and became a new manufacturing branch. Modern electronics is the base for computer technology devices and the manufacture of the products of the telecommunications, vacuum technology and instrument industry.

Computer technology devices include:

—computer technology data transmission equipment and functional units (including digital control devices and computing units, information processing units, signal generators, etc.),

—electronic logic machines (including small computers and computers for data processing and technical-scientific purposes),

—input and output units for directly readable and coded information, and

—direct access moving element storages (which includes magnetic tape preparation equipment and machines for translating punch cards and punch tape to magnetic tape and from magnetic tape to line printer).

The most important data for factory sites producing computer technology devices are shown in Table 1, in comparison to combined data for the telecommunications, vacuum technology and instrument industry sub-branches, in view of the fact that the data for sites in the manufacturing branch producing computer technology machines and devices constitute a part of the data for the enterprises listed in these sub-branches.

Table 1. The Ratio of Computer Technology Machine and Equipment Manufacture in the Telecommunications, Vacuum Technology and Instrument Industry, 1970-1978 (the total for the telecommunications, vacuum technology and instrument industry equals 100)

1. táblázat

A számítástechnikai gép- és berendezésgyártás aránya a híradás- és vákuumtechnikai iparban és a műszeriparban, 1970-1978.

(Híradás- és vákuumtechnikai ipar és műszeripar összesen = 100)

%				
(1) A számítástechnika gyártási ág aránya				
(2) Év	(3) a termelés	(4) a foglalkoztatottak száma	(5) a gépek és berendezések bruttó értéke	(6) alapján számítva
1970	0,8	1,1	1,2	
1971	1,3	1,6	3,6	
1972	2,9	2,4	5,0	
1973	4,9	4,5	7,0	
1974	7,5	4,5	7,8	
1975	9,1	5,1	8,5	
1976	10,8	4,9	7,3	
1977	10,5	5,5	7,6	
1978	10,6			

1. The ratio of the computer technology manufacturing branch
2. Year
3. Production
4. Number of employees
5. Gross value of machines and equipment
6. Calculated on the basis of

As a result of the swift rate of growth the ratio of the production of computer technology machines and equipment now exceeds 10 percent in the production of the telecommunications, vacuum technology and instrument industry sub-branches and it is probable that the transforming effect of the structure defined in the program will be increasingly felt in these sub-branches and indirectly in the machine industry as a whole. Looking at the factors of technical accoutrements (number of employees and gross value of machines and equipment) one also finds an increasing ratio which is given special importance by the fact that these sub-branches show stressed development within the machine industry and even this is significantly surpassed by the development of the computer technology manufacturing branch.

The central computer technology development program prescribed for the Fourth 5-Year Plan the production by the enterprises of computer technology devices worth 8 billion forints. During this period the value of the production of computer technology machines, equipment and devices came to 7.6 billion forints, 5 percent below the prescription. The delay in or rescheduling of some of the prescribed investments probably played a role in the shortfall in the manufacture of computer technology devices.

According to the prescription for the Fifth 5-Year Plan the production of computer technology machines and equipment must reach 20.5 billion forints. In the time thus far, the years 1976-1978, the value of production came to 12.4 billion forints so that in 3 years of the Fifth Five-Year Plan 60.5 percent of the prescription was fulfilled.

In addition to fulfilling the quantitative prescriptions they are attempting to guarantee the modernness of the products produced by purchasing licenses and with domestic research, thus influencing the value judgments of the international market in a favorable direction.

Both purchased licenses and domestic development have a considerable role in the production of computer technology devices. The most significant licenses include the license for various versions of the French 10 010 small computer, the licenses for the American line printer character barrel and hammer seat and the manufacturing license for the French Fox-3 magnetic disc storage. Table 2 shows the production of products manufactured on the basis of some of the more important licenses.

Table 2. Production of Some of the More Important Computer Technology Products Manufactured on the Basis of Purchased Licenses, by Type

2. táblázat

Vásárolt licenck alapján gyártott egyes fontmábi számítástechnikai termékek termelése típusonként 1972-1977.

(1) Típusjel, megnevezés	(2) Mennyiség	1972	1973	1974	1975	1976	1977
1010 FX számítógép (4)	db	30	23	26	—	—	—
1010 FX számítógép	db	2	10	10	24	16	39
1010 FX számítógép	db	—	8	44	102	95	91
1010 FX számítógép	db	—	—	—	—	1	9
1010 FX számítógép	db	2	3	30	172	253	422
1010 FX számítógép	db	31	124	253	126	258	476

[Key on following page]

Key:

1. Type designation, name
2. Quantity
3. Units
4. 1010 B computer
- 1010 BM computer
- R-10 computer
- R-12 Computer
- Alphanumeric line printer
- Pex-3 magnetic disc storage

Various small computers and other computer technology equipment have been manufactured as a result of domestic research and development. The domestic industry can point to significant achievements in recent years in the production of equipment, peripherals and sub-assemblies connected with computers. Table 3 shows the development of the production of some of the more important products manufactured on the basis of domestic research.

Table 3. Production of Some of the More Important Computer Technology Products Manufactured on the Basis of Domestic Research, by Type

3 táblázat

Hazai kutatás alapján gyártott egyes fontosabb számítástechnikai termékek termelése, típusonként

(1) Típusjel, megnevezés	(2) Menny. egys.	1972	1973	1974	1975	1976	1977
1010-as típusú számítógép (4)	db	198	692	680	702	598	596
PC-4000 kisgépi számítógép	db	—	12	—	7	4	3
TPA-1 számítógép	db	32	25	24	28	28	30
TPA-70 számítógép	db	—	1	3	11	9	8
TPA-1140 számítógép	db	—	—	—	—	—	4
CR-600 kártyaolvasó	db	—	—	—	—	21	123
Display	db	—	—	11	44	163	163

Key:

1. Type designation, name
2. Quantity
3. Units
4. Prepmat punch tape preparation equipment
- PC-4000 small computer
- TPA [Stored Program Data Processing] computer
- TPA-70 computer
- TPA-1140 computer
- CR-600 card reader
- Display

New technological phases needed for the manufacture of computer technology devices have been developed; for example, the wave soldering technology for printed circuit sheets, which improves productivity, the wire wrap technology (a new connection procedure), which is needed for series manufacture, etc. The reliable soldering of electronic elements also facilitates the use of modern integrated circuits.

It appears that the most substantial production problem is the fact that parts supply for computer technology devices is still not solved; it is expensive to import parts; they can be obtained primarily from dollar accounting markets; etc. The creation of suitable parts manufacture would be a further task for domestic research and development. The initial steps in the domestic manufacture of integrated circuits represent some achievement in this area. The know-how for mass manufacture purchased in 1976 (Fairchild Camera and Instrument Corporation, USA) makes possible the production of 15 million units per year. Manufacture has begun (Table 4) and will probably reach capacity by 1980 and thus an ever larger proportion of the import of integrated circuits can be replaced with domestic products. The plastic housed bipolar digital and linear integrated circuits being manufactured are of equal quality to the imported products.

Table 4. Production of Integrated Circuits

4. táblázat
Integrált áramkörök termelése

(1) Év	(2) Termelés 1000 db-ban	(3) Típus/ változatok száma
1970	23,2	4
1971	81,4	6
1972	11,2	3
1973	307,9	5
1974	780,4	4
1975	433,4	11
1976	862,6	19
1977	2899,8	26
1978	8514,0	—

Magy.:

1. Year
2. Production, in thousand units
3. Number of types

The participation of our homeland in the uniform computer system (ESZR) determines the development of the sale of computer technology devices. The basic activity of the ESZR is made up of prescribing development and applications goals, practical realization of the principle of the division of labor and ensuring the utilization of modern technology. Joining in the ESZR made possible--among other things--the development of the computer technology manufacturing branch on the basis of socialist integration cooperation and created the possibility of economical manufacture. Our homeland undertakes the production of equipment the economical manufacture of which is ensured by the given market, which can be used in various ways, and for the production of which we have related manufacturing experience. The products we have undertaken to manufacture include, for example, those peripherals which can be used with the larger ESZR central units too. (Punch tape readers and punchers, punch tape data preparation equipment, fix disc storages, data transmission equipment, etc.) The industry manufacturing Hungarian computer technology devices also tries to satisfy a part of domestic

amount, in addition to the products defined in the ESZR, and it looks for possibilities on the dollar accounting market. Naturally the products belonging to the ESZR make up the greater part of the sales, as is shown in Table 5. In the first year of the Fourth Five-Year Plan, 1971, the sales linked to the ESZR did not yet have an adequate role in the total sales of computers and computer technology devices (they made up only 20.8 percent of all sales) but in the last year of the Fourth Five-Year Plan, 1975, the ratio of products prepared and sold on the basis of ESZR prescriptions exceeded 85 percent and this opened up export possibilities for computer technology devices.

Table 5. A Breakdown of the Sales of Computers and Computer Technology Devices by Major Groups

1. táblázat

Számítógép és számítástechnikai eszközök értékesítésének megoszlása főbb csoportok szerint

(1) Megnevezés	1971	1973	1975	1977
ESZR előírása alapján készült termékek (2)				
számítógépek	20.8	69.2	86.8	85.7
perifériák (3)	—	34.6	49.9	41.7
számítógép	20.8	30.5	32.5	30.1
adattároló berendezések	—	2.1	4.4	5.9
ESZR előírása szerint készült termékek (4)				
számítógépek	69.3	9.1	9.8	10.3
perifériák (5)				
számítógép	37.8	2.5	3.3	2.5
perifériák	31.5	3.6	4.5	4.0
adattároló berendezések	—	3.0	2.0	3.8
alkalmazások, alkatrészek (6)	9.9	1.7	3.4	4.0
összesen értékesített számítógép és számítástechnikai eszköz (7)	100.0	100.0	100.0	100.0

Key:

1. Designation
2. Products prepared on the basis of ESZR prescriptions, total
3. Of these:
 - Computers
 - Peripherals
 - Data transmission equipment
4. Products prepared not according to ESZR prescriptions, total
5. Of these:
 - Computers
 - Peripherals
 - Data transmission equipment
6. Subassemblies and parts
7. Total sales of computers and computer technology devices

We are exporting an ever greater proportion of the computer technology products: in 1977 nearly 70 percent of all sales were for export. In the years 1972-1977, for example, Hungarian industry exported 440 small computers, 1,307 units of tape punch and punch tape reading equipment, and 429 units of magnetic storage. The marketing trends for computer technology devices are shown in Table 6.

Table 6. Sales of Computers and Computer Technology Devices, Domestic and for Export

6. táblázat

A számítógép és számítástechnikai eszközök értékesítése belföldre és exportra							
(2) Megnevezés	(1) Számítógép és számítástechnikai eszközök értékesítésének megoszlása		(értékesítés összesen = 100)				
			1971	1972	1973	1974	1975
Értékesítés összesen (3)			100,0	100,0	100,0	100,0	100,0
Ebből (4)							
Belföldön			64,1	63,9	33,6	33,2	31,6
Rubel elszámolású exportra			33,9	36,1	66,0	63,8	63,8
Dollár elszámolású exportra			—	—	0,4	1,0	2,6
							2,4
							3,2

Key:

1. Breakdown of Sales of computers and computer technology devices, total sales equals 100
2. Designation
3. Total sales
4. Of these:
 - Domestic
 - Ruble accounting export
 - Dollar accounting export

The marketing of computers includes providing certain intellectual services. Satisfying the needs of the users represents an extraordinarily large and complex task because computers are used in very many different areas and services must accommodate to different needs in regard to both basic and applications software.

The enterprises manufacturing computers deliver with the machines the system needed to operate the machines (the basic software) thus the value of the intellectual service connected with the machine delivered does not appear separately, it is contained in the price of the product. Research institutes and the research units of some enterprises are preparing and selling to an increasing degree separate intellectual services (applications software) for further use of the computers already sold. During the Fourth Five-Year Plan, the years 1971-1975, the enterprises sold applications software worth more than 12 million forints and the demand is increasing further because the income deriving from intellectual services was worth 12.6 million forints in 1975 [sic] and 16.3 million forints in 1977.

Conditions for and Effectiveness of the Production of Computer Technology Devices

The central computer technology development program contained investment prescriptions of 1.8 billion forints for the years 1971-1975 for the initiation and development of the manufacture of computer technology devices.

This was modified on two occasions and a part of it was rescheduled for the Fifth 5-Year Plan; thus the investment and development prescription for the two plan periods came to 2.1 billion forints. As of 31 December 1977, 69.1 percent of this, investments of 1,451.7 million forints, had been realized. Between 1971 and 1977 the manufacturing development investments for computer technology products of the enterprises included in the program came from the following sources: 31.6 percent from the enterprises' own funds, 33.9 percent from bank credit, 33.5 percent from developmental loans and 1 percent from council awards. As we have mentioned already, the rescheduling of a part of the investments probably played a role in the problems connected with the manufacture of computer technology devices.

The initiation of domestic manufacture of computers and computer technology devices made necessary the import of some materials, parts and subassemblies. The growth of production, the use of licenses and manufacturing experience are making it possible to replace with products of domestic manufacture an ever larger part of the import content of direct material use. It can be established on the basis of approximate data for the enterprises manufacturing computers and computer technology devices that the ratio of materials deriving from direct import, in the materials costs for the computers and computer technology devices manufactures, was 78.3 percent in 1971. This had dropped to 39.2 percent in 1977. In addition to the decreasing trend for use of imported materials there has been a significant moderation in the ratio of materials derived from dollar accounting import in regard to all import materials used. Despite the decreasing ratio the value of material use deriving from dollar accounting import is still quite considerable; it came to 434 million forints in 1977.

If we look at the expenditure side of production, the ever greater technical development expenditures and research achievements have resulted in significant savings and it appears that the efforts being made to decrease the use of import materials are paying off.

Developmental expenditures increased significantly with the raising of the technical level. The technical development cost in the value of products completed approached 10 percent in 1977.

We will try to show the technical level of computer technology manufacturing activity from the side of technical equipment used. The technical equipment index--the value of machines and equipment per worker--was 61.1 percent higher in 1971 and 83.1 percent higher in 1977 than the combined average for the telecommunications, vacuum technology and instrument industry, indicating that the ratio of newly purchased and newly put into operation machines and equipment was substantially greater in the manufacturing branch producing computer technology machines and devices. The use of new technology greatly contributed to increasing productivity in the computer technology manufacturing branch, which substantially surpasses the increase in productivity for the telecommunications, vacuum technology and instrument industry sub-branches and that for state industry as a whole. The manufacturing enterprises want

to further increase the technical level through cooperation, purchasing licenses and developing domestic and international technical and scientific contacts. A very successful contact has developed between research institutes and manufacturing enterprises as the equipment developed in the institutes is handed over for industrial manufacture.

The enterprises in the branch manufacturing computers and computer technology devices have realized considerable and ever increasing profits. The profits of the branch manufacturing "computer technology machines and equipment" made up only 0.8 percent of the total combined profits of the telecommunications, vacuum technology and instrument industry in 1971 but made up 15.8 percent in 1977. As we have already noted, the ratio of this branch in these sub-branches was 1.3 percent in 1971 and 10.5 percent in 1977 on the basis of production. According to the data the production of computer technology machines and equipment is very profitable for the enterprises, significantly exceeding the average profitability for other products. It should also be noted that the profit moderating effect of the modification of the regulators is having less effect in this area, which appears from the fact that the 1977 profit was nearly 50 percent more than in 1975.

In 1977 the social net income content of the production reached 1.4 billion forints, which is 10.9 percent of the social net income created by these sub-branches in 1977. The value of the social net income deriving from the manufacture of computer technology machines and equipment amounted to 2.3 percent of the social net income realized by the machine industry in 1975, 2.8 percent in 1977. Some more important indexes suggest that economicalness and efficiency develop more favorable from year to year in the manufacturing branch producing computer technology machines and equipment.

In 1977 the increase in social net income per employee was nearly six times that for 1971 in the branch manufacturing computer technology machines and equipment.

As a result of the limited nature of the data available we examined, instead of the index for social net income per assets engaged, the development of social net income per gross value of machines and equipment used in the computer technology manufacturing branch, which also indicates the increase in the value of the machines and equipment acquired. The economicalness of mechanization improved with the increase in mechanization. The social net income per gross value of machines and equipment increased 2.5 times between 1971 and 1977 in the manufacturing branch producing computer technology machines and equipment. (Computer technology seems to be a good bit more profitable and economical when a comparison is made with the corresponding indexes for the telecommunications, vacuum technology and instrument industry sub-branches.)

Of considerable significance among the achievements is the use of small capacity computers of domestic manufacture because these ensure the spread of the computer technology view in a wide sphere and lay the foundations for

computerized guidance systems. The trend toward the spread of small computers is encouraged by the fact that they make it relatively more simple, in terms of applications techniques, to switch to the larger capacity machines.

The computer park has increased significantly in our homeland in recent years, from 120 units in 1970 to 382 in 1975 to 521 in 1977. The number of machines of domestic manufacture is constantly increasing; there were 20 in 1970 and 219 in 1977. During the Fifth 5-Year Plan the program intended to satisfy domestic needs primarily with machines of domestic manufacture or from socialist import, ESZR machines or machines compatible with the ESZR. In consideration of this the ratio of machines imported from capitalist countries is decreasing more and more.

The increase in the ratio of machines of domestic manufacture is of special significance, considering that operational problems, and in some case repair problems, are easier to solve in the case of machines of domestic manufacture. Table 7 shows the development of the composition of the computer park. The ratio of machines of domestic manufacture in the operating machine park exceeded 40 percent in 1977.

Table 7. The Composition of the Computer Park, According to Origin and Compatibility with the Uniform Computer System

7. táblázat

A számítógép-állomány összetétele eredet és Egységes
Számítógép Rendszer-kompatibilitás szerint

		%			
(1) Megnevezés		1970	1975	1976	1977
Hazai gyártású (2)					
ESZR-gépek		—	12,0	14,1	13,0
Egyéb gépek		16,7	27,5	27,3	29,0
Hazai gyártású gépek összesen (3)		16,7	39,5	41,4	42,0
Importgép szocia- (4)					
lista országból					
ESZR-rel kom- patibilis gépek		—	15,7	16,7	17,7
Egyéb gépek		21,7	12,1	10,2	9,4
Szocialista orszá- (5)					
gokból impor- tált gépek					
összesen		21,7	27,8	26,9	27,1
Importgép tőkés (6)					
országból					
ESZR-rel kom- patibilis gépek		2,5	7,1	7,0	6,7
Egyéb gépek		59,1	25,6	24,7	24,2
Tőkés országok- (7)					
ból importált					
gépek összesen		61,6	32,7	31,7	30,9
Számítógép-állom- (8)					
mány összesen		100,0	100,0	100,0	100,0

[Key on following page]

Key:

1. Designation
2. Of domestic manufacture
ESZR machines
Other machines
3. Of domestic manufacture, total
4. Imported machines from socialist countries
Machines compatible with the ESZR
Other machines
5. Imported machines from socialist countries, total
6. Imported machines from capitalist countries
Machines compatible with the ESZR
Other machines
7. Imported machines from capitalist countries, total
8. Total Computer Park

It can be established from the above that the creation of computer manufacture in our homeland has resulted in the creation of a new manufacturing branch which represents a high technical culture and which has a favorable influence in the production structure of the telecommunications, vacuum technology and instrument industries and thus on the production structure of the machine industry.

The fact that our homeland participates in the ESZR has created the possibility for the economical manufacture and sale of the products involved, primarily on ruble accounting markets, and the possibility for the gradual replacement of dollar accounting imports with products of domestic manufacture.

The success of the manufacture of computer technology products would be ensured in a fundamental way by the further development of the domestic parts manufacturing base. One of the significant achievements of steps in this direction was the build-up of integrated circuits manufacture, on the basis of which more 9 million units were produced in 1978.

The necessity of a permanent modernization of the further development of parts manufacture is proven by the fact that even in 1977 the ratio of materials, parts and subassemblies deriving from import was considerable--nearly 40 percent--in the materials costs of computers and computer technology devices produced.

In addition to increasing the manufacture of equipment linked to the ESZR or compatible with it, it would be desirable to expand the dollar accounting markets with the manufacture of peripherals and parts linked to the ESZR computers operating in various countries, primarily in developing countries.

8984

CSO: 2502

ACHIEVEMENTS OF VIDEOTON ENTERPRISE HIGHLIGHTED

Budapest HETI VILAGGAZDASAG in Hungarian 22 Mar 80 p 15

[Excerpt] Over two-thirds of the computers and computer devices made in Hungary are products of the Videoton Electronics Enterprise. The Enterprise's achievements include the R-10 computer and its special variations, the Videoplexes and the programmed multiplexers, the management minicomputer and the bank terminal, line printers produced in large series, displays and their intelligent versions as well as the ever-increasing numbers of program packages. Due to past achievements, Videoton computers operate at the energy distributing center of CEMA located in Prague. Furthermore highly reliable systems of complex architecture and many peripherals have been shipped to the railways, the petroleum industry and the power industry of the Soviet Union.

Research and development continue apace at Videoton. To list just a few accomplishments: Through cooperation with the CADO firm, the VT 30 management installation was fashioned. CADO delivers the central unit, a number of peripherals and the program packages. Videoton makes the display and the line printer. Videoton's 23000 line printer is produced on the basis of an American license. It is an all-purpose printer based on a small computer, electronic information processing systems, data communication system and data input terminals.

The R 10 M and R-11 computer systems which are modern devices for decentralized data processing are made on the basis of a license from the French firm, SEMS. The VDT 52 100 is an alphanumerical CRT video terminal family based on new microprocessor control. Its modular circuit construction permits flexible designing of families suitable for solution of problems of various levels from the simplest versions which are teletype compatible to display systems capable of performing the most demanding terminal functions as well as versions which are IBM compatible.

The Videoplex data recording system makes possible quick, accurate and simple data preparation, the service of large and medium computers. It is worth noting that Czechoslovakia purchased 16 such data recording systems to prepare

its needs. The VT 20 equipment is a minicomputer information system. In the recent past the Videoton Electronics Enterprise has concluded a contract with the BONDOP cooperative enterprise for delivery of such a system. The system will be used to compile statistics on the milk and fodder production of the member and partner farms. The information system will help determine branch development, inventory management as well as professional counselling and the possible structural evolution of the large farms.

PMI 2502

BRIEFS

SOVIET MINICOMPUTERS FOR HUNGARY--According to Gyula Suranyi, technical deputy director of the National Computer Technology Enterprise, the immediate future belongs to the minicomputer. At present the technical laboratory of the enterprise is testing and examining the first small computer which has arrived from the USSR. Computers of this type have virtually unlimited use: data processing and collecting, control of various processes including production processes at various stages, control of scientific experiments. In our country conditions are ripe for use of computers of this sort. A great many works and factories have sections and plants far from their parent enterprise. A small computer could be installed in every factory unit or plant and be linked to a large computer. We are now making measurements. We will select the enterprises and institutes in which the first 10 small computers to arrive this year will be put into operation. Such small computers can be set up in any office. They require little space and no complex air-conditioning. They are easy to operate. We will supply the programs and the service. They are adaptable, and anyone can learn to operate them. [Excerpts] [Budapest ESTI HIRLAP in Hungarian 10 Apr 80 p 3]

CSO: 2502

ACTIVITIES, HARDWARE OF INFORMATION SCIENCE ASSOCIATION DESCRIBED

Warsaw INFORMATYKA in Polish No 10, Oct. 79 pp. 26-29

[Article by Andrzej Aranowski of the Information Science Association]

[Text] The basic statutory task of the Information Science Association [ISA] is to provide computerized information services on behalf of units of the national economy. These services include:

- Designing and programming information systems and the operations and maintenance of same.
- The organization of data collection, the preparation of computer information carriers, and the formation and maintenance of data files.
- The operation of computing systems.
- The implementation of programming.
- Software and hardware service.
- Computerized information consultation.
- Personnel training and advanced training.
- Planning the organization of computer centers and operations technology.

The association's tasks were contained in the "Program for the Development of the ISA for 1976-1980," approved in 1976 by the leadership of the Ministry of Science, Higher Education, and Technology, and modified as a result of a change in the economic development strategy of the Polish People's Republic, and presented for acceptance to the Committee for Information Science in March of last year as a "Program of Development of Open-Access Computerized Information Services for 1978-1980." In accordance with this "Program," the most important task of the ISA became the satisfaction of requirements for computerized information services with relatively low outlays and costs of services, and with the application of the most effective methods of planning and programming of the systems.

The subject of this article is the realization of the tasks placed before the association in 1976-1979.

Currently, there are 14 independent production enterprises within the structure of the ISA, including the Center for the Planning and Application of Computerized Information headquartered in Warsaw (it came into being on 1 April of this year, as a result of the merger of ZETO Warszawa "Electronic Computer Computation Establishment, Warsaw" and the Information Science Research and Development Center).

The ZETO enterprise include from two to six voivodships as the area of their activity. In some voivodship, branch computer centers are in operation. All together, 47 ZETO computer centers are in operation in 25 voivodships.

Hardware Policy

The ZETO network is equipped with 81 data processing computers, of which 46 are ODRA 1300 computers and 25, RYAD computers. Forty-three computers operate in a tape-disk configuration. Teleprocessing is conducted on three computers.

The basic directions of the hardware policy of the association were described in the aforementioned "Program for the Development of the Association:"

quantitative development of computer equipment, with particular attention given to the Uniform System Ryad computers.

The maximum utilization of the existing configurations--increasing the effectiveness of process, and in so doing, lowering the costs of providing computerized information, and creating the conditions for improving the quality of the aforementioned services.

The equipping of the centers with teleprocessing systems and modern equipment for recording data on magnetic tape.

The practical realization of these principles, however, has encountered limitations resulting from the country's economic development strategy that has been adopted for the current five-year plan. In this situation, particular stress in the hardware management area of the ISA is being placed on the further improvement of the utilization of hardware or the more efficient use of processing technology. Considerable improvement has occurred in the operating time use factor of computers, which is measured by the ratio of process time in practice to the rated work time, extrapolated to three shifts. Whereas in 1976, this factor amounted to 74.2 percent, in 1978, it was 86.8 percent. In the field of processing technology, the time period of using the most reliable operating systems, such as GEORGE-2 and GEORGE-3 for the ODRA 1300 machine, and the operating system for the JC [unified system] RYAD computers was tended, as a result.

Table 1. Development of the Potential of the Information Science Association

(in million zlotys)	1976	1977	1978	1979 (plan)
Total investment outlay: including purchase of hardware	895.7	450.4	488	895.8
Value of fixed assets	248.8	278.8	271.1	277.4
	1 646.5	2 458	2 259	2 426.1

1. Total investment outlays including purchase of hardware.
2. Value of fixed assets.



The Location of Enterprises of the Information Science Association, and their Operational Areas

Services

The association is concentrating its activities primarily in services for the benefit of organizational units which are characterized by considerable dispersion, or units whose size and needs do not justify the installation of in-house computers.

The main subscribers to the services of the association are: the Ministry of Finance (17.7 percent value of sales of services in 1978) and the Ministry of Machine Engineering Industry (14.6 percent). Going down the list, we should note the Ministry of Heavy and Agricultural Machine Industry (7.7 percent) and the Ministry of Agriculture (7.0 percent). The steady increase in the share of the services provided for the benefit of the components of the Ministry of Science, Higher Education, and Technology also deserves attention.

The basic form of activity of the ZETO network and cooperation with users are the agreements on cooperation during the period of development and application of computerized information systems^{*}/ concluded in 1974-1978. The realization of these agreements involves over 52 percent of the production potential of the association, which denotes a high degree of specialization of plant and equipment.

The following should be listed as some of the most important services carried out by the ISA:

For the Ministry of Finance:

--Servicing of banking operations, with the use of the Bank Operations System (SOB) in 106 branches of the Polish National Bank, in which approximately 45 percent of all the operations of the Polish National Bank are carried out.

--Servicing of savings accounts in the branches of the PKO Bank in support of the National Savings Accounts Records System (KSERO), which encompasses 211 branches and about 78 percent of the total PKO savings accounts.

--The servicing of long-term investment credits for rural inhabitants--The System for Automated Servicing of Long-Term Investment Credits of Rural Inhabitants (ZODKILW), which is operated for the needs of a number of branches of the Bank of the Food Economy.

--The development of Computerized Information Accounting System (SIR), uniform for the entire national economy, in which, about 350,000 persons are currently employed in such work.

For the industrial ministries (Ministry of the Metal Industry and Ministry of Heavy and Agricultural Machine Industry, and others):

--Processing services, about 600 million zlotys in value; information computerization of such fields as materials management, technical preparation and planning of production, the employment management and the wage fund, the accounting of costs and financing.

--Planning and programming work in the area of new solutions of computer information systems, whose share in these types of services of the ISA in 1978 exceeded 62 percent; the Ministry of Machine Engineering Industry with a share of about 24 percent in 1978 is the main subscriber to these services.

For the Ministry of Agriculture

--The servicing of several spheres of activity in the units for agricultural construction, hydro-construction, land reclamation, and the technical services for agriculture.

--The operation of the SYMLER system for the automatic evaluation of the raising of cows, for the needs of the regional livestock breeding stations.

--The following subbranch systems are being prepared for operation in DETO: SEKUP system for keeping records on, and estimating the field cultivations of seed and the optimization of the apportionment of synthetic fertilizers for the needs of agricultural enterprises and individual farms.

For Housing Construction Cooperation

--Operation of the SECIE system of keeping records on members and candidates, which also encompasses the analysis of the structure of needs within a range of residence sizes.

--Servicing residential rental accounting system.

For 'SPOLEM' CZSS [Union of Consumer Cooperatives]

--Aiding the computer information activities of department stores and selected retail sale points (DETO-1 and DETO-1 system).

--Record keeping services for members, shares, and dividends, with the use of the DYWID system.

For the Social Security Agency

--The working up of the REM computerized system for annuities and pensions, which covers the entire country.

For the Ministry of Materials Management

--Preparations are being made for the acceptance through ZETO of a sub-branch system called: "Computerized Model Information System for Enterprises Trading in Producer Goods" on computers of a Unified System of Electronic Digital Computers (JS EDC), for gradual implementation in the units of this ministry.

Table 1. Structure of Services and Growth Rate of Sales

	1975		1976		1979	
	(mln zł)	(proc.)	(mln zł)	(proc.)	(mln zł)	(proc.)
Value of ZETO Services	780	100	1 789.8	100	1 800	100
Growth Rate		100		99.7		99.5
including						
—planning, programming and consultation	118.0	15.2	331.3	18.7	513.0*	28.5
—creation of machine						
data carriers	80.8	7.9	119.7	6.9	158.8	8.7
data processing	108.1	78.8	1 043.1	71.8	1 430.4	74.5
other service	29.1	3.5	51.5	2.9	54.0	3.0

*The lowering of prices for planning and programming services has been taken into account.

The services in the data processing area, which showed up in 1976-1979 on a constant level of 70 percent of the value of sales, were the main element in the structure of sales.

The high growth rate of the sales of services (more than double in 1978 as compared with 1976) is primarily the result of the machines purchased in 1975-1976 going into full operation.

As of 1977, activities were begun in the association aimed at the intensive development of the exporting of computerized information services. In 1978, the export activity was introduced for the first time into the association's plan. The value of exports last year amounted to 369,700 foreign exchange zlotys in the second payments area [capitalist countries] (growth of 23 percent over 1977), and 368,000 foreign exchange zlotys in the first payments area [socialist countries] (growth of 166 percent).

In the structure of exports until now, the servicing activities occupied a dominant position. As a result of broad promotional activities conducted jointly with the "Metronex" Foreign Trade Enterprise, the association

is already realizing the first contracts for planning and programming services. The promotional activity has been continued this year in the socialist countries, and also in West Germany, Great Britain, France, and the Netherlands, and in selected Third World countries. The sale of finished software products on the Western market is encountering stiff barriers, in view of our technological lag with respect to level of application and hardware on that market. However, the Polish offerings in the area of programming services carried out on hardware produced by Western European firms is getting some interest.

Cooperation with Schools and Units of the Ministry of Science, Higher Education, and Technology

The parent ministry, the Ministry of Science, Higher Education, and Technology, is becoming one of the most important subscribers to the association's services. The value of services performed by the ISA for the Ministry of Science, Higher Education, and Technology in 1978 amounted to 127,650,000 zlotys, which is 7.5 percent of their total services. Among the most important work undertaken and executed for this ministry are: the computerization of the administration of the schools of higher education, and the Management Information Service System of the ministry (SOIK).

The association works closely with the schools, offers services in the fields of scientific-technical computations, servicing hardware, teaching methods, management systems of schools of higher education, and in this case, making use of the experiences and the improvements of the personnel of higher educational institutions. Cooperation of the ISA is developing best with the following schools:

- ZETO Kielce with the Higher School of Engineering in Radom.
- ZETO Bydgoszcz with the Technological-Agricultural Academy in Bydgoszcz.
- ZETO Gdansk, with the University of Gdansk.
- ZETO Rzeszow with Rzeszow Polytechnic Institute.
- ZETO Krakow, with the Academy of Economics and the Academy of Agriculture.

Cooperation involves primarily the organization of joint computer centers and the operation of installed computer equipment.

In addition to this, agreement on cooperation (joint planning and programming work, the creation of joint teams for working out concrete subjects, making computer time available, etc.) also encompasses the following ZETO centers and schools:

--Warsaw--Warsaw University, Warsaw Polytechnic Institute, Main School of Planning and Statistics.

--Gdansk--Polytechnic Institute

--Lodz--Lodz University, Lodz Polytechnic Institute

--Lublin--Maria Curie-Sklodowska University, Academy of Agriculture

--Kielce--Swietokrzyska Polytechnic Institute

--Koszalin--Higher Antiaircraft Defense Officers School

--Krakow--Jagiellonian University, Academy of Agriculture, Academy of Mining and Metallurgy

--Poznan--A. Mickiewicz University, Academy of Economics, Poznan Polytechnic Institute

--Szczecin--Academy of Agriculture, Szczecin Polytechnic Institute, Pomorze Academy of Medicine, Higher Pedagogical School.

In April of this year, an agreement was also concluded between the ISA and the Center for Scientific, Technical and Economic Information (CINTE), a concerning computerized information service for selected subsystems of the scientific, technical, and organizational information government system--SINTO. In accordance with the agreement, within the framework of specific understandings concluded with CINTE, the Center for the Planning and Application of Computerized Information will carry out planning and programming work and will provide computer servicing of the specialized information systems within the composition of SINTO:

--On scientific-research and development work SYNABA

--On scientific cooperation with foreign countries SAZAPS

--On translations

Research and Development Work

The association is devoting a significant part of its planning and programming potential to research and development work. The research and development work is a substantial factor for the intensification of the development of the Information Science Association.

In 1976-1979, the main directions of research and development work in the association were:

The development of tooling software, i.e., a set of means for helping the planning and the formation of programs; the work concerning data base management systems were of particular importance.

The development of basic software, in particular, the development of improved technological versions of systems software for the JS RYAD computers.

The methodology of realizing the implementation on the basis of programmer equipment.

The research work was conducted within the framework of 88 subjects, of which, 52 were completed. The results of work on data base management systems (RODAN, STEP, SYKON systems), the working up of technological versions of DOS and OS operating systems, numerous auxiliary devices for the programming process, and ODRA-RYAD conversion programs are among the most significant achievements that ought to be listed.

The coordinator of the research activity of the association in 1976-1978 was the Information Science Research and Development Center. Currently (since 1 April of this year), the Center for the Planning and Application of Information Science, which has also been entrusted with tasks in the area of propagating and implementing the results of research and development work is fulfilling the role of research and development mainstay of the ZETO network.

Personnel and Training

In 1976-1979, in the Information Science Association, action was taken aimed at bringing about a more efficient structure of employment and the creation of the appropriate conditions for the realization of the tasks designated in the "Development Program." The following should be listed among the fundamentals of the internal employment policy of the Information Science Association:

An increase in the number of workers directly involved in production, with particular account taken of designers and programmers (the share of this occupation group in total employment amounted to 23.7 percent in 1976, and 24.8 percent in 1978).

A limitation of the employment of administrative--office workers, and workers in the data preparation field.

A constant raising of skills within the framework of organized training and in its own centers, as well as in other centers and abroad.

Table 2. Employment in Selected Occupational Groups in the Information Science Assn.

	1976		1977		1978	
	Average annual	Structure (percent)	Average annual	Structure (percent)	Average annual	Structure (percent)
Total employment of this, ZETO	5 394		5 821		6 138	
--designers and analysts	5 073	100,0	5 510	100,0	5 806	100,0
--programmers	456	9,0	512	9,3	591	10,2
--operators	747	14,7	787	14,3	848	14,6
--maintenance personnel	1 230	24,3	1 346	24,4	1 437	24,6
--administrative and office workers	827	16,4	603	11,0	650	11,2
ISRI--Information Science Research and Development Center	578	11,4	601	10,9	618	10,6
Central Office of the Information Science Assn.	267		256		278	
	54		55		54	

The personnel potential of the association, according to the status as of 31 December 1978, amounts to 6,380 persons. The increase in productivity, the improvement of the organization of work, and the hardware limitations have brought about a significant drop in the employment rate. Whereas in 1977, the employment increment was 437 persons, (an 8.6 percent growth relative to the year before), in the current year, the planned employment increment shows up as 29 persons (0.5 percent as compared to last year). It is worth while to emphasize that this employment increment is accounted for mainly by workers directed to newly-organized computer centers, located beyond the headquarters of the primary units.

The development of computer equipment, data processing, technology and computerized information systems demands a constant improvement in the skills of both our personnel and those of the subscribers. The Information Science Association uses a large variety of forms of training, such as in-house courses, courses organized externally, course conferences, and seminars. The Multibase Computer Information Training System conducted at the association in 1976 made it possible to reduce the costs of training through the standardization of programs, materials, and requirements placed on the course participants. In 1976, 3,500 workers and about 500 subscribers were trained at the Information Science Association, whereas in 1978, about 5,000 ZETO workers and about 1,000 subscribers were trained.

* * *

The activity of the ISA in 1976-1979 was characterized by:

--Consistent implementation of industrial methods of organizing production-- both in processing and in software production.

--The intensification of the use of available means, in particular, computer hardware.

--The constant stirring to determine the plant and equipment and goods and services specialization, and thereby, to achieve a more precise definition of the role of the association in the national economy.

The realization of these basic directions of activity made it possible to achieve the production and economic effects presented. It will be possible to achieve a complete evaluation of the realization of the goals and tasks spelled out in the "Program" after the entire period encompassed by planning has past. The aforementioned attempt at evaluation of the activity thus far is, at the same time, an attempt to define the basis of the development of the association in 1981-1985. It is worthwhile to add that the first version of the new development program of the Information Science Association has come to pass. The basic elements of this program will be presented in one of the coming issues of INFORMATYKA.

FOOTNOTE

*/ See: "Agreements of the Information Sciences Association on Cooperation. Cooperation with Units of the Ministry of Agriculture," INFORMATYKA No 6/78; "Cooperation with Units of the Ministry of Finance," INFORMATYKA No 7-8/78; "ZETO-MAXIMATIC for SPOLEM," INFORMATYKA No 9/78; "Cooperation with the Material Economy Administration," INFORMATYKA No 11/78.

5808

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END

SELECTIVE LIST OF JPRS SERIAL REPORTS

EASTERN EUROPE SERIAL REPORTS

EAST EUROPE REPORT: Economic and Industrial Affairs
EAST EUROPE REPORT: Political, Sociological and Military Affairs
EAST EUROPE REPORT: Scientific Affairs

WORLDWIDE SERIAL REPORTS

WORLDWIDE REPORT: Environmental Quality
WORLDWIDE REPORT: Epidemiology
WORLDWIDE REPORT: Law of the Sea
WORLDWIDE REPORT: Nuclear Development and Proliferation
WORLDWIDE REPORT: Telecommunications Policy, Research and Development

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